



**Department of
Higher Education**

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Ohio Transfer 36 Guidance Document: Natural Sciences



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Introduction

This document provides an overview of how to prepare course materials for submission to [Ohio Transfer 36](#), which guarantees student transfer of general education coursework among public institutions in the state. As institutions prepare to make submissions in the Course Equivalency Management System ([CEMS](#)), individuals involved in the process (faculty, administrators, and staff) should use this guidance document to become familiar with the steps required for a course to be approved for inclusion in Ohio Transfer 36. This effort entails [collaboration](#) of people in many roles on Ohio's campuses and at the Ohio Department of Higher Education. The ultimate goal is a high-quality, meaningful educational experience for Ohio's students.

If you have questions after reading this guidance document, contact: Michelle Blaney, Associate Director, Articulation & Transfer Policy at mblaney@highered.ohio.gov or Jessi Spencer, Senior Director, Articulation and Transfer Policy, Budget, and Constituent Relations at jspencer@highered.ohio.gov.

Components of a Submission for Ohio Transfer 36

1. Course Details Form

- This document will help your institution complete the Course Details page in CEMS.
- Be sure that the information on the Course Details Form matches the syllabus and other documentation in the submission.
- Ohio Transfer 36 coordinators should work with faculty subject matter experts to complete Course Details Forms.

2. Learning Outcome Template

- This document will allow faculty who are familiar with the course to provide brief statements that indicate how it fulfills each of the [Ohio Transfer 36 learning outcomes](#).
- Because Ohio Transfer 36 focuses on learning outcomes, please describe what the course requires students to do, not simply the topics the course covers.
- For each learning outcome, CEMS responses should address:
 - A. **the specific course outcomes and related content through which students achieve this Ohio Transfer 36 learning outcome.** What course materials and activities relate to this outcome?
 - B. **assessment of student achievement of this Ohio Transfer 36 learning outcome.** How do instructors determine the degree to which students have met this outcome?
 - C. **key locations in the attached course documents that demonstrate student focus on this Ohio Transfer 36 learning outcome.** Where in the submitted course documents (syllabus, assignments, etc.) can faculty reviewers find content, activities, and/or assessments related to this outcome? Identify several key examples to demonstrate the importance of the outcome in the course. Please avoid referring to the same assignments repeatedly to explain how the course meets each of the outcomes. Include a variety of activities in your explanations to show that the course as a whole emphasizes the Ohio Transfer 36 outcomes.
- Please label the parts of each learning outcome response as A, B, and C.
- Responses need not be lengthy. Think of the CEMS responses as guides to the attached course documents, highlighting the most important elements on which reviewers should focus for each Ohio Transfer 36 learning outcome.
- Please avoid copying and pasting material that's available elsewhere in the submission (for example, in the syllabus). The CEMS learning outcome responses are intended to allow faculty to provide clear, concise explanations to other faculty (the members of Ohio Transfer 36 review panels) about how the course supports Ohio Transfer 36 learning outcomes.
- Text entered into CEMS won't incorporate advanced formatting (for example, bullet points, indenting) from word processors, so please use simple text and spacing.

3. Supporting Documents

- Upload **an up-to-date working syllabus** that includes:
 - course learning outcomes. Course learning outcomes should support—but need not be identical to—the Ohio Transfer 36 learning outcomes.
 - information about the course textbook and/or other readings (if applicable). For open educational resources, links are helpful.
 - a detailed calendar of readings and activities. Please provide clear identifying information for the reading assignments on the schedule (authors, book/article/chapter titles, etc.). Dates should be recent but need not be current.
 - a list of graded assignments with points/weights/percentages for each assignment.
- Upload **sample activities/assessments** that demonstrate student achievement of the Ohio Transfer 36 learning outcomes.
- Please limit the number of attachments and use file names that will allow panel members to easily identify each document.
- A master syllabus is acceptable in place of a working syllabus as long as the information listed above is included. Some master syllabi don't include a detailed calendar/schedule for the term.
- A master syllabus (in addition to a working syllabus) is often helpful in outlining the required elements of a course regardless of instructor or delivery method. A working syllabus may provide a representative example of how the course is taught, but the institution should be committed to meeting the Ohio Transfer 36 learning outcomes in all sections of a course.
- If a course has not yet been offered, the submitter should still provide the information listed above so that the panel can evaluate each learning outcome.

Tips

- **Submit early!**
 - Allow yourself an extra review cycle or two before a deadline in case it becomes necessary to do a resubmission.
 - Just because a submission was returned, that doesn't mean that it was rejected by the review panel. OATN staff will sometimes make suggestions for improving a submission before it is forwarded to the review panel, especially if it seems likely that the panel will request missing information.
 - Please don't wait until the submission deadline of a review cycle to send in submissions. You should leave time for OATN staff to resolve any possible issues with the submission while still allowing them to forward it to the review panel on time.
- If you would like OATN staff to review materials before submitting in CEMS, please reach out in advance of the review cycle deadline.
- If your institution would like to connect with an Ohio Transfer 36 faculty review panel lead, please reach out to OATN staff to schedule a meeting.
- If a panel's review comment is not clear, please send OATN staff an email. We may be able to provide additional information.
- If faculty members from your institution serve on review panels, take advantage of their expertise and guidance even if they are not preparing the submission. A list of faculty panel members from your institution can be obtained by sending OATN staff an email.
- Check out the OATN newsletter! There is a section devoted to Ohio Transfer 36, TAG, and CTAG submissions. Updates and deadlines are often mentioned in the articles, along with a link to the complete submission and review timeline, to help you prioritize your institution's submissions.
- If you asked CEMS to reset your password and have not received an email from "ATC-Help" within five minutes, please contact OATN staff immediately. CEMS will not tell you if you are using the wrong user ID.
- We are all in this together! If for whatever reason you are stuck, please feel free to contact OATN staff.

Natural Sciences Submission Specifics

Excluded courses:

- Remedial or developmental courses, special topics courses, narrowly focused courses, technical or pre-technical courses and skills-based courses.
- Courses that focus exclusively on content coverage without addressing the learning outcomes for the Ohio Transfer 36. Career preparation courses, non-credit continuing education courses, life experience courses (unless life experience credit, such as military training or other prior learning experience, is approved in the future for an Ohio Transfer 36 credit by the statewide faculty review panel).

Ohio Transfer 36 Natural Sciences Lab Course: Attach a document titled “lab memo” which should include a short narrative confirming the mode of delivery, indicating the credit hours assigned to the course or how it is a component of a larger course, and describing how it involves at least 1500 minutes of lab activities. The lab memo document should also include a list and describe, in a few sentences, at least 10 labs in which “students will demonstrate the application of the methods and tools of scientific inquiry appropriate to the discipline, by actively and directly collecting, analyzing, and interpreting data, presenting findings, and using information to answer questions.” **Reason** – The Panel will need to be able to validate that two-thirds of the lab hours involve bona fide, experimental lab activities utilizing the scientific method (identifying/collecting data, manipulating data, evaluating and analyzing data). To that same document append at least one example of a laboratory exercise from the course

Most common source of rejections for laboratory courses: When we look at any laboratory course proposal there are four aspects of those proposals that most often raise red flags and may lead to the rejection of the submission:

- 1) Inadequate descriptions of laboratory activities and no examples of assessments (see lab memo document above)
- 2) The labs are all observational with no opportunity to experience the variability of real data. For example, in a botany class, if all the labs are dissecting parts of plants and identifying the anatomical parts of plants this is not a general education science lab. Learning the proper use of a microscope and identifying cell types on a slide is important, but not every lab can involve mostly observation and memorization of discipline-specific terminology. The review panel often spends time counting the number of labs that include at least some part of the scientific method happening. It might be measuring things which then need some statistical analyses, it might be making predictions and devising testable hypotheses from observations and then testing them (maybe via data given to them not actually performed in the lab) and so forth. The panel wants to see 2/3 of the labs having some scientific process experience for the student so typically we

are counting to see if 10 of the labs of a 15-week course involve meaningful experiences with science. We often receive lab courses in which 3 weeks are used for exams or lab practice and some others involve primarily identification and memorization which hardly require an instructor's presence and involve no meaningful interaction with the students. What are the aspects of the scientific method we would like to see?

- Understanding of hypothesis and theory from previous data and scientific knowledge
- Testing the hypothesis with an experiment
- Taking real measurements, some of which shows natural variability
- Data analysis and interpretation through graphing, averaging, calculations or other standard methods. Such as determining a value from the slope of graphed data.
- Understanding that if the results do not support the hypothesis that the hypothesis requires modification of small or large proportions.

3) Lack of instructor involvement/feedback. Many distance/virtual laboratory courses don't include evidence that the instructors will do anything but grade worksheets, manage the course website, and give out the final grade. This demonstrates a lack of synchronous, feedback to the students. This is a sure way to find rejection!

4) Not having enough lab time. We really do look for an accounting of the minimum amount of time spent in laboratory. If, based on the materials provided, we think the labs can be done by students in 15 minutes and there are several lab times devoted to introduction and exams/quizzes we will ask to see much more evidence that there is student engagement in learning science by doing science.

Course Resubmissions: For resubmissions the Natural Sciences panel highly recommends providing a written narrative in a separate document. That document should be clearly titled (e.g., Responses to Panel Concerns) and should include a copy of the panel comments from the returned submission followed by your responses. Those responses should direct the panel members to any other documents where supporting information may be found.

Distance/virtual laboratory course proposals and the meaning of the last two bullet points of our laboratory policy:

- “involves synchronous feedback² on safety (and consequences of unsafe actions), correctness of procedure, and progress toward experimental goals; and
- “involves effective interaction with the instructor at several points during each lab activity”

Below is the interpretation of the Ohio Transfer 36 Natural Sciences panel of these outcomes for laboratory course submissions and especially those proposed for distance/virtual format.

The sentiment is two-fold. Lab safety procedures are an important, although not primary, part of the scientific method. In some disciplines concerns about safety is obvious, such as in chemistry with caustic chemicals and open flames, but any natural science lab will also have concerns about individual student safety and the safety of the community. Ideally, in an in-person lab students would receive instructions and reminders about precautions to take or put in place just before and probably during the time that person is engaged in that process. You can write all of these things down and require students read them prior to attending class and have a quiz to give them incentive to take them seriously, but in a live lab the lab instructor is also going to be reminding students of safety and providing feedback to students that are not engaged in proper procedures.

This experience is difficult to replicate in a distance /virtual lab in which the student is likely working alone. The spirit of this portion of the guidelines is to encourage distance/virtual laboratory courses to find creative ways to provide synchronous feedback to students as they perform the lab itself rather than just providing a before-lab video and maybe some reflection questions afterward. We recognize that this is not easy to accomplish. For some courses this may not be of great importance because the safety considerations are not as important (the things that could happen are not as bad as others). For those lab activities, pre-lab videos containing general considerations are all one would probably require.

But for many labs, live or near-live feedback is desirable. This might include a requirement that labs be performed within certain timeframes when an instructor/teaching assistant is online and able to watch or at least hear what is happening. The student might be required to “check-in” during the time when they are doing the lab and talk to an assistant just to say what they have done, have them ask a few questions and give feedback based on their answers. This would be similar to the TAs role in an in-person lab as they walk around to tables, observing and asking questions to be sure each group of students are following procedures. This would not necessarily have to occur for every laboratory exercise.

An Ohio Transfer 36 submission could outline several labs that involve particular safety concerns showing how those safety issues are addressed in those labs. But all labs need not have this type of interaction and feedback. For example, maybe there are two labs that have opportunities to teach about particular safety concerns in the discipline. Over the whole semester the students could be given a set of “lab times” in which they choose to be engaged in those particular labs and will be engaged through a streaming platform with an instructor while doing a portion of that lab.

Secondly, synchronous feedback is not just about safety! It is the view of the panel that learning the scientific method is an essential part of the general education experience. The scientific method is not simply a formula or list of things to do but a way of thinking and organizing one’s ideas and testing those ideas. Ideally students should be required to follow all or at least portions of the process of asking questions from observations, coming up with testable hypotheses and testing those hypotheses. In class students should be engaged with instructors in the process of

developing and testing ideas from observations and experimental data. The best way to do that is with an active instructor and/or groups of students talking with each other. When the Ohio Transfer 36 panel assesses a distance/virtual course proposal they are looking for places during the course where students are given feedback on their ideas for testing hypotheses and how they draw conclusions from their tests, or data they are given that model the type of data that scientists could collect, and then propose next steps in the process. Not all labs need be this involved but each need to have some component of the scientific method embedded in the laboratory exercise and report.

This “synchronous feedback” could include examples of a few labs in which a focus is placed on interaction with the students whose intent is to emphasize the dynamic nature of the scientific method. This ideally would involve instructors having direct verbal communication with students (could be interviews/office hours in which they talk about their data/hypothesis/proposed test or theoretical test they could perform) but may also include required written interaction in which the instructor is not simply grading the work but must provide feedback that the student acknowledges in some fashion (an iterative learning process). Again, they would not have to be this engaged in every laboratory, but it would be some component built into the scope of the course to provide this educational experience.



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Natural Sciences Exemplars

Institutional Natural Sciences exemplars are currently in progress. Natural Sciences exemplars will be shared statewide once finalized.